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 GB 1075535  
 GB 1074798  
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 GB 713460  
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(54) Mounting Electric Motors

(57) A suspension arrangement for an electrical motor comprises an inner member (2) adapted for connection with the electrical motor (6), an outer member (1) provided with an opening in which the inner member (2) is located, and a substantially star-

shaped arrangement of at least three resilient supporting members (3, 4, 5) coupled between the inner and outer members (2, 1), the supporting members (3, 4, 5) being formed to provide relatively high radial rigidity and relatively low axial rigidity. The suspension arrangement—suitable for electric motors used in electric typewriters.

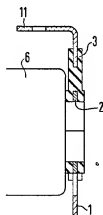


FIG 1

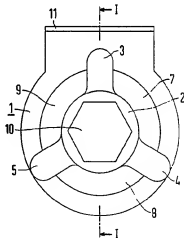


FIG 2

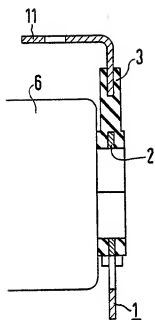


FIG 1

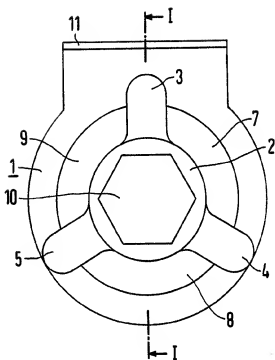


FIG 2

## SPECIFICATION

**A Suspension Arrangement for an Electrical Motor and a Method of Producing Such an Arrangement**

5 This invention relates to a suspension arrangement for an electrical motor and a method of producing such an arrangement.

A suspension arrangement for an electrical motor is described in German Auslegeschrift No. 12 52 785, in which, in order to isolate the axial and rotational oscillations of small electromotors in recording devices, arms consisting of steel wire or laminated steel in spring elements with plastics housing on their ends are securely inserted or embedded in a housing.

15 German Offenlegungsschrift No. 22 19 182 describes an arrangement in which support members are provided for reducing tangential and radial oscillations to enable motors, more particularly electromotors in all types of office machines, to be suspended in a vibration-reducing manner. These members are formed by an outer ring and an inner ring connected to the outer by elastic ribs and arranged concentrically to the motor axis. To avoid uncontrollable angular displacements of the motor as a result of an unequal load, a support is provided having areas of contact and arranged on the outer ring, and stops are provided on the inner ring. These stops are arranged so that the inner ring is positioned above them and the areas of contact of the support are in operative connection with this when limiting the lateral deflection of the inner ring.

35 According to one aspect of this invention, there is provided a suspension arrangement for an electrical motor, the arrangement comprising an inner member adapted for connection with an electrical motor, an outer member provided with an opening in which the inner member is located, and a substantially star-shaped arrangement of at least three resilient supporting members coupled between the inner and outer members, the supporting members being formed to provide relatively high radial rigidity and relatively low axial rigidity.

Preferably, the inner and outer members each comprise a rigid, substantially annular member. These annular members are advantageously arranged in a substantially concentric manner.

50 The inner member could be adapted for connection with a boss of an electrical motor.

The outer member could be adapted for connection with supporting means for the

55 arrangement.

The supporting members could be made of rubber, for example they could be pre-vulcanized on both the inner and outer members.

The inner and outer members could be made from stamped sheet metal, or they could be made from moulded plastics material.

60 According to another aspect of this invention, there is provided a method of producing such a suspension arrangement for an electrical motor,

65 the method comprising the steps of: locating, in a mould for vulcanization, the inner and outer members, in the form of a single piece of sheet metal or moulded plastics material provided with cut-outs corresponding to the supporting members; vulcanizing the piece; and stamping-out or breaking-off the portion of the vulcanized piece which bridge the inner and outer members between the supporting members.

The suspension arrangement could be used in combination with a shaded pole motor.

75 An office machine could be provided with such a suspension arrangement.

The invention will now be described, by way of example, with reference to the accompanying drawing, in which:

80 Figure 1 shows a partial sectional view of a central suspension arrangement for a motor, fitted to a front end of an electro-drive motor, and Figure 2 shows a front plan view of the arrangement shown in Figure 1.

Referring to Figures 1 and 2, the central suspension arrangement essentially comprises an outer ring portion 1, provided with an angled, free end 11, and an inner, concentric ring portion 2, and also between the ring portions 1 and 2, a supporting star comprising three rubber supporting arms 3, 4 and 5 which are vulcanized on the ring portions 1 and 2.

The inner ring portion 2 is provided with a 95 profiled hexagonal inner opening 10 in which a shaded pole motor 6, serving as a drive motor, is received by means of one of its front ends which has a correspondingly profiled boss so as to be form-locking and/or force-locking. The entire suspension arrangement is fixed, by means of the angled end 11 of the outer ring portion 1 in, for example, the housing of an electric typewriter.

In a manner not shown in the drawing, the drive of the armature shaft of the shaded pole motor 6 to the drive mechanism of the type arm of the electric typewriter is effected via a belt which exerts a radial propelling force perpendicularly to the longitudinal axis of the shaded pole motor 6, and thus loads the supporting arms 3, 4 and 5 in a radial direction.

110 In order to achieve, on the one hand, a high degree of radial rigidity of the supporting arms 3, 4 and 5 to absorb the belt tension and, on the other hand, in order to damp the axial oscillations of the shaded pole motor 6, the supporting arms 3, 4 and 5 are provided (as is evident from a comparison of Figure 1 and Figure 2) with a relatively great tangential breadth but a slight axial thickness, the ring portions 1 and 2

120 representing per se rigid supporting elements.

A method of manufacturing such a suspension arrangement involves inserting the ring portions 1 and 2 into a vulcanizing mould as a one-piece stamped sheet metal or moulded plastic component having, in the region of the supporting arms 3, 4 and 5, suitable cut-outs corresponding to the supporting arms. After this vulcanization, the bridges from the outer to the inner ring portions 1 and 2, between the newly formed,

flexible rubber supporting arms 3, 4 and 5, are stamped-out or broken-off. When these bridges have been stamped-out or broken-off, openings 7, 8 and 9 are produced between the outer ring portion 1 and the inner ring portion 2 such that only the supporting arms 3, 4 and 5 remain between the outer ring portion 1 and the inner ring portion 2. This method of producing a suspension arrangement achieves a very exact alignment of the ring portions 1 and 2 because, for example, the ring portions 1 and 2 when vulcanizing the supporting arms 3, 4 and 5 are not subject to alterations in position caused by a worn vulcanizing mould or thermal stress.

Notches can be provided in the assembly to facilitate the removal of said bridges.

The required ratio of axial rigidity to radial rigidity is easy to achieve by the choice of the hardness of the rubber and/or the cross-sections of the rubber parts.

#### Claims

1. A suspension arrangement for an electrical motor, the arrangement comprising an inner member adapted for connection with an electrical motor, an outer member provided with an opening in which the inner member is located, and a substantially star-shaped arrangement of at least three resilient supporting members coupled between the inner and outer members, the supporting members being formed to provide relatively high radial rigidity and relatively low axial rigidity.

2. A suspension arrangement according to claim 1, wherein the inner and outer members each comprise a rigid, substantially annular member.

3. A suspension arrangement according to claim 2, wherein the inner and outer members are arranged substantially concentrically.

4. A suspension arrangement according to any preceding claim, wherein the inner member is adapted for connection with a boss of an electrical motor.

5. A suspension arrangement according to any preceding claim, wherein the outer member is adapted for connection with supporting means for the arrangement.

6. A suspension arrangement according to any preceding claim, wherein the supporting members are made of rubber.

7. A suspension arrangement according to claim 6, wherein the rubber supporting members are pre-vulcanized on both the inner and outer members.

8. A suspension arrangement according to any preceding claim, wherein the inner and outer members are made from stamped sheet metal.

9. A suspension arrangement according to any of claims 1 to 7 wherein the inner and outer members are made from moulded plastics material.

10. A suspension arrangement according to any of claims 1 to 7, wherein the inner and outer members have been formed from a vulcanized, single piece of sheet metal or moulded plastics material provided with cut-outs corresponding to the supporting members, portions of the vulcanized piece which bridge the inner and outer members between the supporting members having been stamped-out or broken-off.

11. A method of producing a suspension arrangement according to any of claims 1 to 7, the method comprising the steps of: locating, in a mould for vulcanization, the inner and outer members, in the form of a single piece of sheet metal or moulded plastics material provided with cut-outs corresponding to the supporting members; vulcanizing the piece; and stamping-out or breaking-off the portions of the vulcanized piece which bridge the inner and outer members between the supporting members.

12. A suspension arrangement according to any of claims 1 to 10, in combination with a shaded pole motor.

13. An office machine provided with a suspension arrangement according to any of claims 1 to 10 or claim 12.

14. A suspension arrangement for an electrical motor substantially as herein described with reference to the accompanying drawing.

15. A method of producing a suspension arrangement for an electrical motor substantially as herein described with reference to the accompanying drawing.